Acute Fetal Distress - Cesarean Section: the Temporal Relation

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Abstract

Objective: *To assess clinical correlation between pathological changes of the RCF (fetal heartbeat) - during labor and maternal-fetal changes depending on time of extraction the fetus (cesarean).*
Material and method: *The correlation between fetal suffering and installation time intervention (birth or cesarean operation) was studied on 33 parturient SUUB hospitalised in the period 2005-2008, which presented as common feature seriously altered fetal status at birth (Apgar score <7) - translated by severe respiratory distress that required ventilation. Blood samples were taken from the radial artery immediate postpartum and then every 8 hours.*
Results: *Of the 33 ventilated newborn babies, 28 were recovered and 5 died, noted that one infant was premature, others had normal birthweight. The exitus occurred in 24-72 hours post partum, Apgar score ranged 1-3 1 'and did not exceed 3 to 5'. Changes recorded in FHR: tachycardia - 3 cases, moderate bradycardia - 7, severe bradycardia - 3, early deceleration - 1, late deceleration - 19. Time to acidosis in 50% of fetuses is significantly shorter in case of late deceleration (115 min) than in the case of variable deceleration (145 min) or flat route (185 min).*
Conclusions: *This study confirms the temporal relationship between the onset of pathological changes of the FHR and metabolic acidosis. The longer the extraction time the worse fetal prognosis.*
Keywords: *fetal distress, acidosis, respiratory distress, bradycardia*

Objective

This study aimed to assess the relationship between external intrapartum cardiotocography changes and materno-fetal changes and the need of cesarean fetal extraction.

Knowing the compensatory fetal mechanisms and the factors controlling fetal cardiac rithm and blood circulation leads to a correct interpretation of the external intrapartum cardiotocography, increasing the accuracy of information from 20% to 75% for acute fetal distress.

Being an emergency hospital and having a multidisciplinary profile, SUUB is adressed by a lot of severe cases with materno-fetal implication. Some of the cases arrive here after a long period of fetal distress. Generally, the reasons for the transfer in our clinic are technical:

Table 1 Etiology and fetal status at birth

Etiology/diagnosis	Number of cases	Apgar score >7 at 1′	Apgar score <7 at 1′
Umbilical cord pathology	3		3
D.P.N.S.	2		2
Modified pelvis (negative labour progression)	10	1	9
Cicatricial uterus	7	1	6
Placenta praevia	4	1	3
No pathology	7	1	6
Total	**33**	**4**	**29**

the absence of a well equiped intensive care service and some intrapartum complications that needs multidisciplinary approach.

Material and method

The relationship between the instalation of fetal distress (as a consequence of labour abnormalities) and moment of intervention (vaginal delivery or cesarian) was asessed on a group of 33 parturients, that were admitted in SUUB between 2005 and 2008.

In all cases, the main interest was represented by severe fetal status at birth (Apgar score <7 - with severe respiratory distress with the necessity of invasive ventilation).

The blood samples were taken from the radial artery postpartum and every 8 hours after.

Fetal pH was determined at the central laboratory of SUUB using „Radiometer - ABL-800 FLEX" equipment (Dr. Dan Adriana).

Out of 33 ventilated new borns - 5 died at 24-72 hours postpartum. Only one was premature (grade II-1700g). The Apgar score varried between 1 and 3 at 1 minute and never increased at 5 minutes.

Results

We present the next aspect regarding the etiology and fetal status at birth

We present a few details:

- Umbilical cord pathology was represented by 2 cases with double pericervical umbilical loops and the third case presented umbilical loop around the fetus body combined with simple nuchal loop.
- From the two cases with normal inserted premature placental separation, in one case with countinuous monitoring in labour, hematoma produced under oxytocin perfusion; hypertonia and late deceleration were identified on the monitor; fetal extraction by a c-section realized after 30 minutes; the fetus had an Apgar score <7, but pH determined immediately postpartum was 7.20.
- From the 7 cases of patients with cicatricial uterus, in 4 parturients the labour contractions started at home; all of them presented rupture of membranes at the admission and meconial amniotic fluid; at 3 fetuses meconial aspiration generated severe respiratory distress and invasive pulmonary ventilation was required.
- In 3 of 4 cases with central placenta praevia - CTG indicates severe fetal bradycardia and Hb <7gr%; the three fetuses extracted using cesarean section had an Apgar <7.
- In 7 cases no evident pathology could be identified to justify the low Apgar score at birth.

As resulted from presented data, only 4 new borns had an Apgar score >7 and 29 a <7 one; we mention that the new borns with the Apgar score <7 had in majority an Apgar score between 1 and 3 at 1 minute after birth.

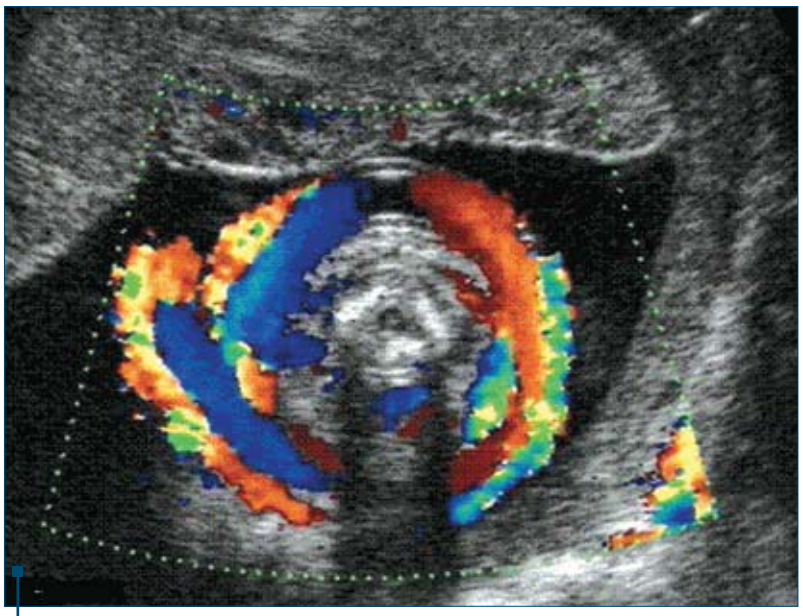


Figure 1. Nuchal loop

Figure 2. Retroplacentar hematoma

Figure 3.
SO case. Late decelerations

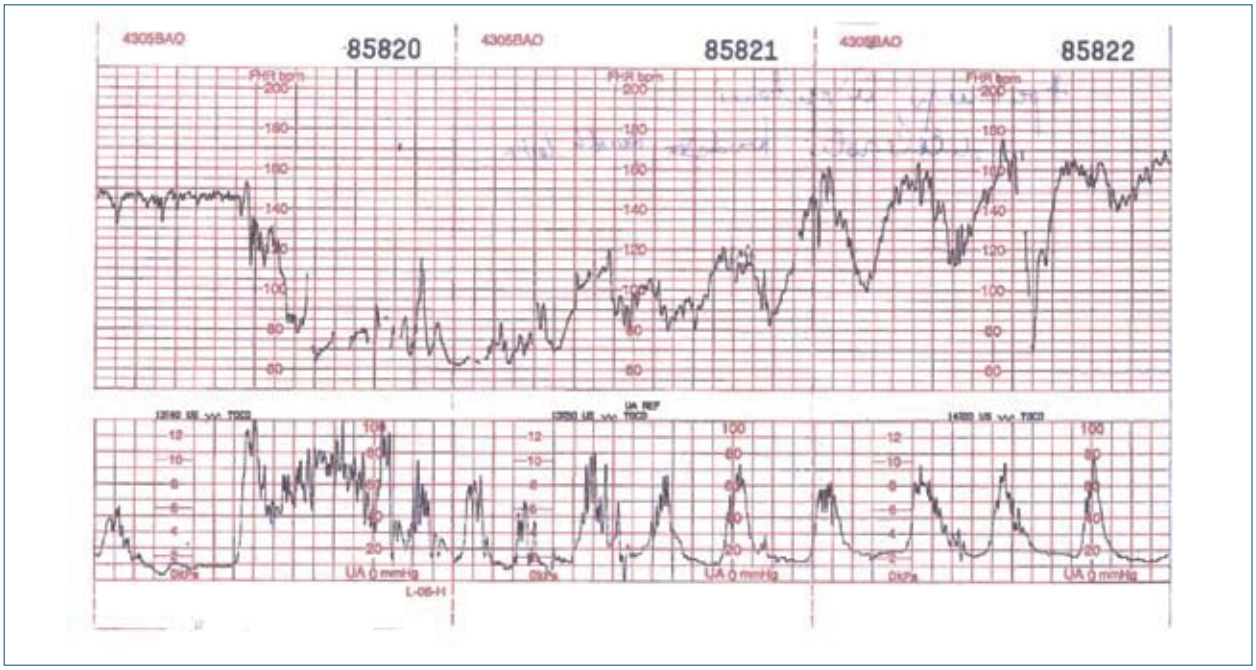
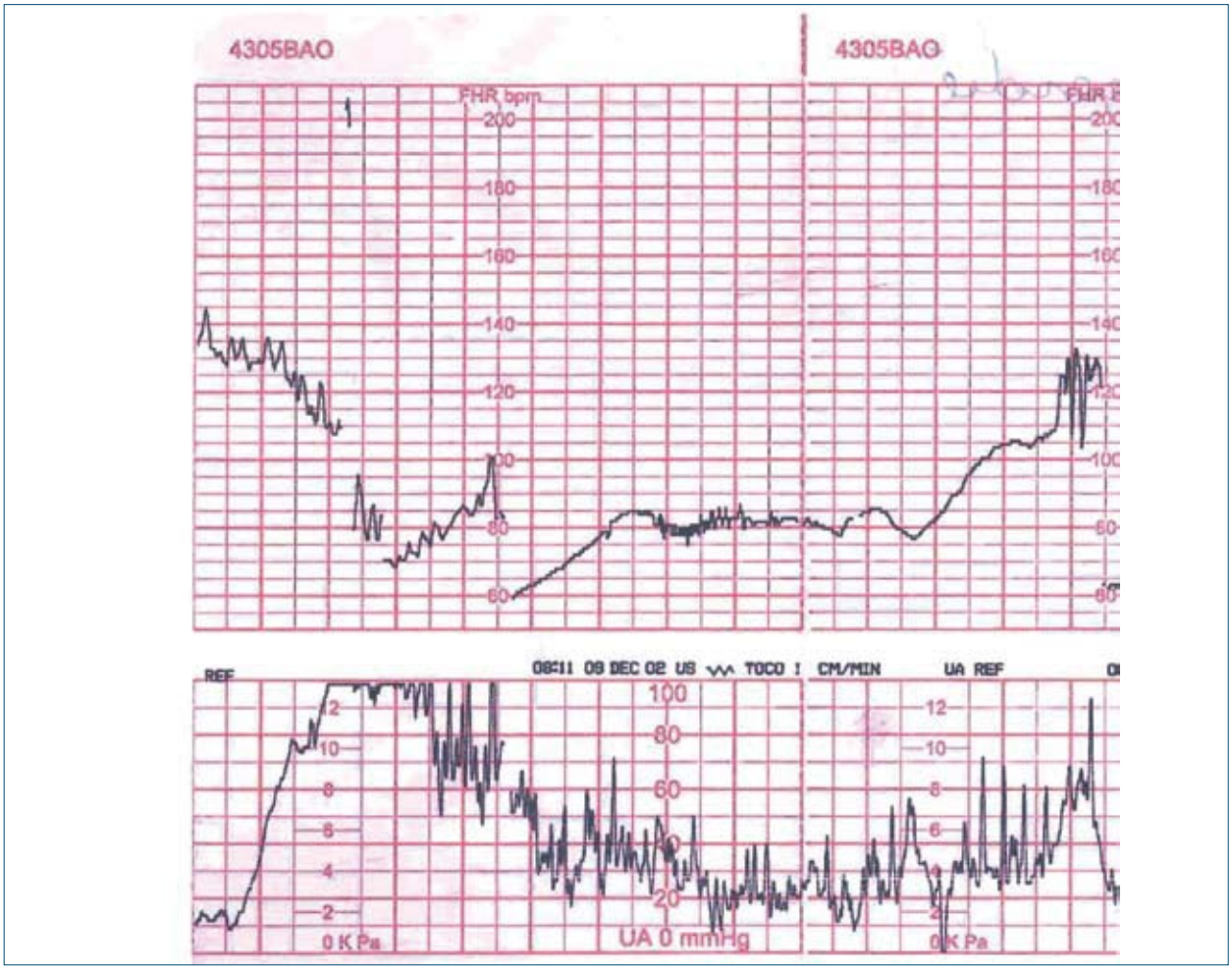


Figure 4.
SR case. Hipercontractility with fetal bradicardia



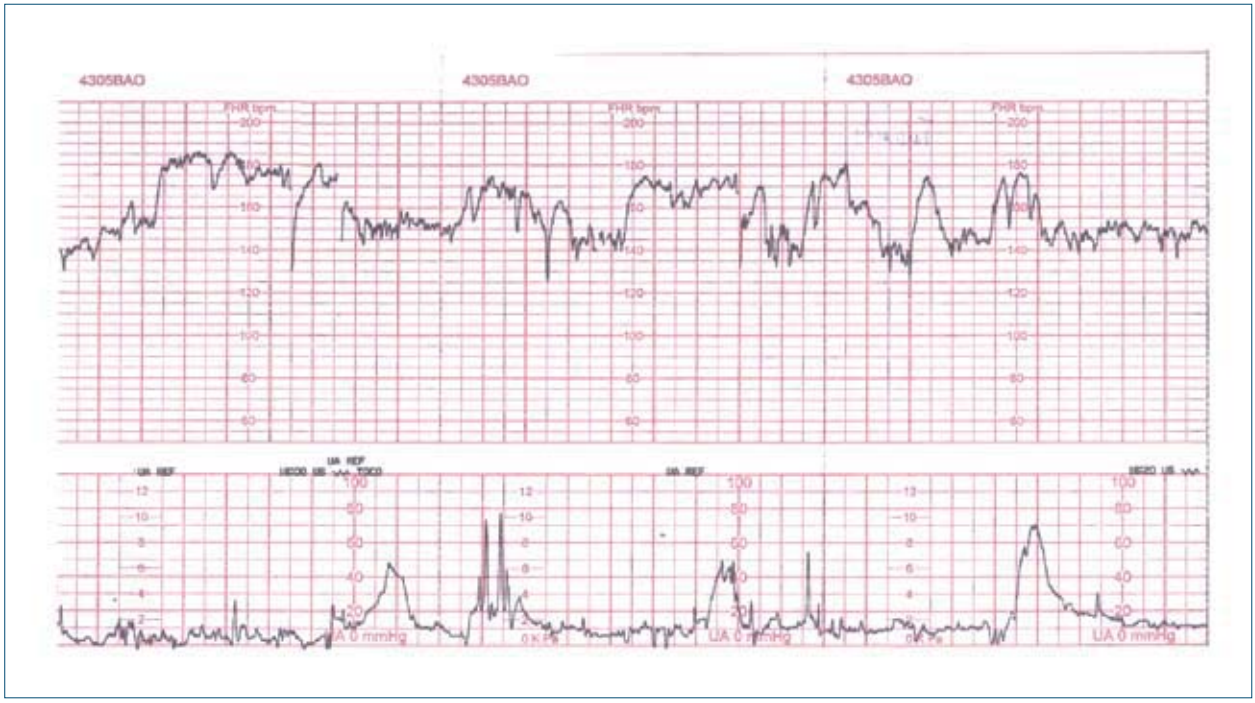


Figure 5.
SI case. Fetal tachycardia, 180 Bpm

From pathological changes seen on CTG (tachycardia, bradycardia, early decelerations) we mention that late decelerations were identified in 19 cases.

We present further a few sugestive CTG monitorings of studied cases.

Discussions

The time interval needed for the metabolic acidosis to install after the evidence of pathological FHR was long studied.

Beard[5] et al have underlined that the abnormal aspects of FHR almost always precede the instalation of acidosis.

Fleisher et al[6] have shown that the time needed for the fetal acidosis to install from the appearance of late decelerations is approximately 115 minutes.

A few authors (Low JA, Page FO etc) have mentioned that variable or late decelerarions have been associated with acidosis in the umbilical artery only in 44-47% of cases.

For Steer et al the FHR sensitivity for the diagnosis of acidosis is 80% with 2/3 false positive.

In his study, Gilstrap LC has shown that moderate and severe bradycardia determine 75% of metabolic acidosis cases.

In our study we revealed a time conection between the FHR changes debut and postpartum pH changes (see Tabel 3).

The FHR changes were represented by:

- tachycardia - 3 cases;
- moderate bradycardia - 7 cases;
- severe bradycardia - 3 cases;
- early decelerations - 1 case;
- late decelerations - 19 cases.

Table 2 Time relation: FHR changes - cesarian - pH value

FHR changes	Number of cases	Less than 90′	pH >7,15	More than 90′	pH <7,15
Tachycardia	3	3	3		
Moderate bradycardia	7	7	7		
Severe bradycardia	3			3	3
Early decelerations	1	1	1		
Late decelerations	19	11	11	8	8
Total	**33**	**22**	**22**	**11**	**11**

Table 3 FHR - pH - Apgar score relation

	Number of cases	pH >7,15		pH <7,15	
		Apgar >7 at 1′	Apgar <7 at 1′	Apgar <7	Exitus
Tachycardia	3	2	1		
Moderate bradycardia	7	1	6		
Severe bradycardia	3			3	1
Early decelerations	1	1			
Late decelerations	19		11	8	4
Total	**33**	**4**	**18**	**11**	**5**

We have to mention that the cesarean was dictated not only by the FHR changes , but also by other markers: meconium stained fluid, emotional lability (anxiety, discomfort).

In 22 cases the cesarean was performed in 30 to 90 minutes from the FHR changes and in 11 cases after 90 minutes. This relatively long period of time was justified by technical reasons: access to the operating room, availability of the anesthesiologist, transfer from other hospitals (Buftea, Giurgiu, Bolintin).

In all 22 cases for wich the cesarian was performed in less than 90 minutes the postpartum pH determination has shown results bigger than 7.15. For the other 11 cases, in wich the cesarian was performed 90 minutes after the FHR changes began, the pH was less than 7.15. In this group 5 deaths were registered (one fetus presented severe bradicardia and 4 late decelerations).

It is obvious that FHR changes wich express a real acute fetal distress (asociated with metabolic acidosis) are represented by late decelerations; in our study we had 3 cases of severe bradycardia (metabolic acidosis).

In other authors studies it is underlined the fact that FHR changes associated with metabolic acidosis are late decelerations (moderate and severe) and variable decelerations (moderate and severe); the other changes, tachycardia, early decelerations do not generate fetal distress and especially do not induce acidosis.

In 50% of the fetuses, the time needed for the acidosis to install is shorter in deceleration cases (115 minutes) than in variable decelerations (145 minutes) or linear (185 minutes).

Ellison et al stated that only late decelerations can be associated with fetal neurological impare.

In a „Collaborative Perinatal Project" article, Nelson and Ellenberg have come to the conclusion that, in the cases of fetuses with cerebral motor disabilities the FHR changes were represented by bradicardia <60bpm, late decelerations or a loss of variability.

Dellinger et al stated that fetal distress is certain in 2 situations:

- repeted variable or late decelerations with the total loss of variability;
- persistent bradicardia with no recovery.

In the next table it is presented the relationship between the FHR changes and pH value:

- **moderate alterations of FHR:** tachycardia (9.01% - 3 cases), moderate bradycardia (21.2% - 7 cases), early decelerations (3% - one case) were associated with a pH value >7.15;
- **severe alterations of FHR:** late decelerations (57%- 19 cases) and severe bradicardia (9.01%- 3 cases), were associated with a pH value <7.15 in 33.3% (11 cases) and >7.15 in 66.6% (22 cases);
- **in 11 cases** - 3 with severe bradycardia and 8 with late decelerations and the pH value <7.15 because of prolonged hypoxemia- the FHR were severe altered; when the compensatory - mechanisms are exceeded, acid-base balance was altered and the pH fell below 7.15.

Conclusions

Our study, has showns that there is a relationship between the FHR changes and the decrease of fetal pH with the start of metabolic acidosis.

The more time is needed for the fetus extraction (from the moment of FHR changes), the worse the prognosis becomes; we underline the time periods mentioned by Murphy et al for the fetus extraction[2].

In 11 cases (58%) late decelerations have been associated with a decreased Apgar score at birth (<7 at 1 minute) and with a moderate affected acid-base balance (pH >7.15); in these cases we witnessed a fast recovery and a reversible character of possible neurological lessions.

In 15% of the cases (5 cases) the fetus could not be recuperated. The low Apgar score, that varried between 1 and 3, generated by FHR changes (late decelerations-4 cases and severe bradycardia- one case) and metabolic acidosis (postpartum pH<7.15) expressed the severely altered fetal status.

The time factor is the key element wich can ensure the fetus rehabilitation. A fast intervention, like the fetus extraction the moment the FHR begin changing (decelerations and severe bradicardia) is extremely beneficial. An unjustified delay of the extraction can lead to the installation of the acidosis with severe cosequences.

In 11 cases the Apgar score between 1 and 3 at 1 minute, increased at 5 minutes. We have to remember Westgate's conclusion: cerebral motor disability percentage is higher when Apgar score maintains between 0 and 3 for more than 20 minutes. ■

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